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IS 1238 (2005): Hurricane Lanterns [MED 26: Oil Burning Appliances]

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(पाँचवाँ पुनरीक्षण)

Indian Standard

HURRICANE LANTERNS — SPECIFICATION

(Fifth Revision)

ICS 91.160.01; 97.180

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BUREAU OF INDIAN STANDARDS
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

January 2005 **Price Group 8**

Oil Burning Appliances Sectional Committee, ME 26

FOREWORD

This Indian Standard (Fifth Revision) was adopted by Bureau of Indian Standards, after the draft finalized by the Oil Burning Appliances Sectional Committee had been approved by the Mechanical Engineering Division Council.

This standard was first published in 1958 at the instance of the Tariff Commission and the Development Wing of the then Ministry of Commerce and Industry. The standard had been widely used and as a result certain changes became necessary. It was first revised in 1964 when new developments were given due recognition. The second revision came in 1969. The third revision was necessitated as a result of experience gained through implementation by the Industry as well as the consumers in 1980. The main changes were in material, luminous intensity and lighting efficiency. In the fourth revision effected in 1985, one additional type of the hurricane lantern has been added with a capacity of 375 ml as is prevalent in the domestic market.

Assistance has been taken from BS 2049 : 1985 'Paraffin lighting appliances for domestic use'. In this revision addition has been made for full fuel level, working surface, test for full container capacity and flame creep.

In the preparing this standard, assistance has been derived from the following:

G/Lamps – 25A : 1984 'Hurricane lanterns, storm and weather-proof', Ministry of Works, Housing & Supply, Government of India.
IND/GS/428(a) : 1954 'Lantern, hurricane', Ministry of Defence, Government of India.
BS : 2049 : 1985 'Paraffin lighting appliances for domestic use', British Standard Institution.

This standard covers both painted and tinned hurricane lanterns, of three types. It is therefore, recommended that purchaser should clearly indicate, in the enquiry or order the finish and type of lantern required.

Due to very nature of the hurricane lanterns, some components have to be replaced frequently. It is essential that the different components made by a manufacturer should be interchangeable.

The requirements in regard to materials have been of acceptable grades, but the use of other materials having characteristics equivalent or better, is not precluded, subject to an agreement between the purchaser and the supplier.

Unless otherwise required by the purchaser, hurricane lanterns conforming to this standard shall be supplied complete with glass globes conforming to IS 1116 : 1984 'Glass globes for hurricane lanterns (*first revision*)' and flat cotton wicks conforming to IS 1740 : 1977 'Specification for flat cotton wicks (*first revison*)'.

The composition of the Committee responsible for the preparation of this standard is given at Annex H.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.

Indian Standard

HURRICANE LANTERNS — SPECIFICATION

(Fifth Revision)

1 SCOPE

This standard covers the construction and performance requirements for wick-fed hurricane lanterns using kerosene, complete with globe and wick.

2 REFERENCES

The following standards contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All the standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

IS No.	*Title*
280 : 1977	Specification for mine steel wire for general engineering purposes (*third revision*)
410 : 1977	Cold rolled brass sheet, strip and foil (*third revision*)
513 : 1994	Cold rolled low carbon steel sheets and strip (*fourth revision*)
1079 : 1994	Hot rolled low carbon steel sheets and strip (*fifth revision*)
1116 : 1994	Glass globes for hurricane lanterns (*first revision*)
1327 : 1988	Method of determination of mass of tin coatings of tin plate (*third revision*)
1740 : 1977	Specification for flat cotton wicks (*first revision*)
1993 : 1993	Single cold reduced tin plate and single cold reduced black plate — Electrolytic and hot dipped tin plates sheet and black plate sheet (*third revision*)
2339 : 1963	Aluminium print for general purpose in dual container
2932 : 1993	Enamel, synthetic, exterior: (a) undercoating (b) finishing — Specification (*second revision*)
4454 (Part 1) : 2001	Specification for steel wires for mechanical springs: Part 1 Patented and cold drawn steel wires — Unalloyed (*third revision*)

3 TERMINOLOGY

3.1 For the purpose of this standard, the nomenclature as indicated in Fig. 1 to 4 and defined below shall apply.

3.1.1 *Hurricane Lantern* — A storm-proof lantern burning kerosene at atmospheric pressure from wick. It is primarily intended for outdoor use.

3.1.2 *Full Fuel Level* — Where no such level is marked or indicated, the highest level to which the appliance can be fitted with fuel without overflowing when it is standing on a rigid flat surface which is within 20° of the horizontal plane.

3.1.3 *Working Surface* — A surface of an appliance necessarily at a high temperature to permit efficient functioning.

4 TYPES

The lanterns shall be of three types as given below:

	Capacity, Min ml
Type 1 (Size 1, *see* Fig. 1)	375
Type 2 (Size 2, *see* Fig. 2)	320
Type 3 (Size 3, *see* Fig. 1)	250

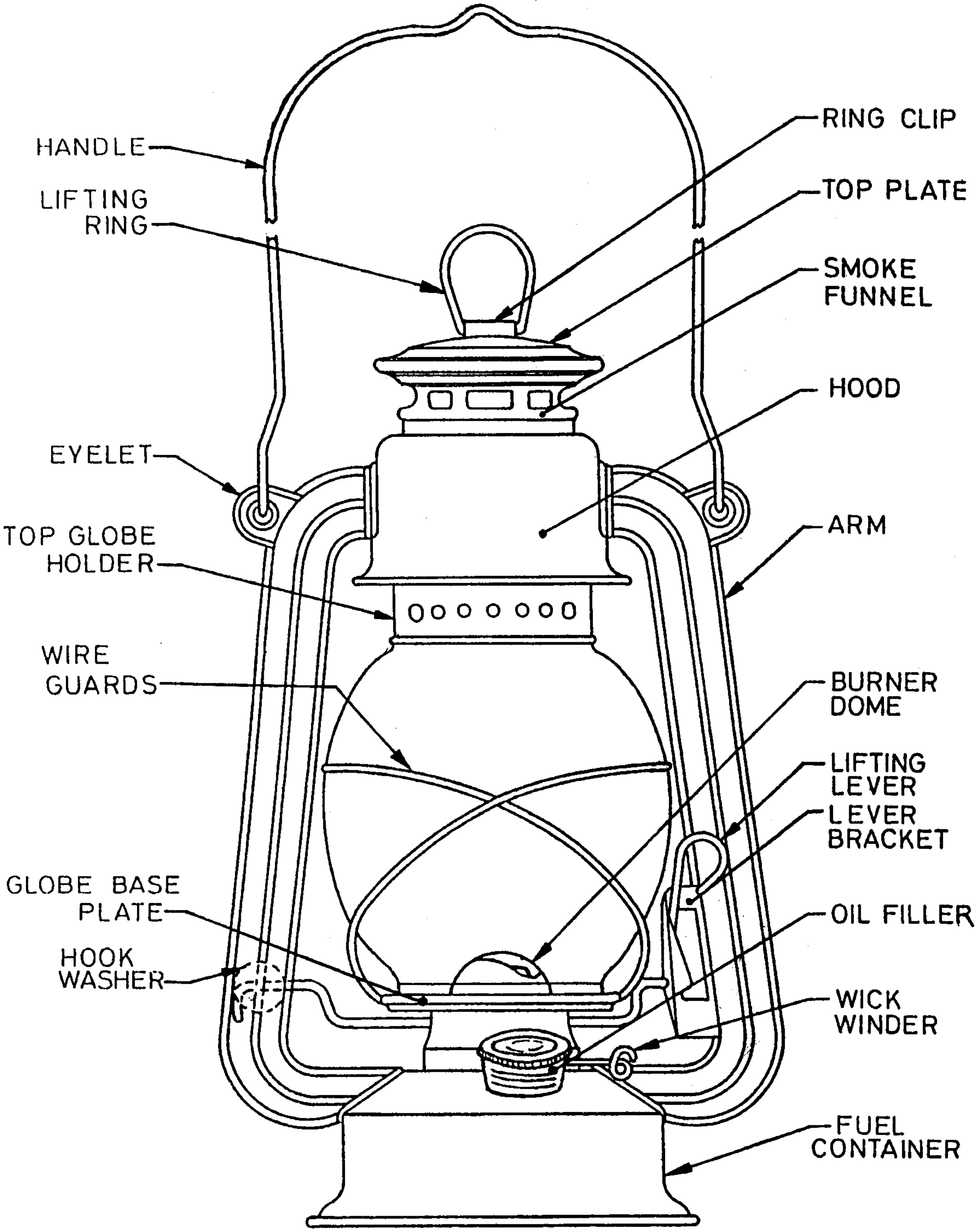


FIG. 1 HURRICANE LANTERN, TYPICAL, TYPE 1 AND TYPE 3

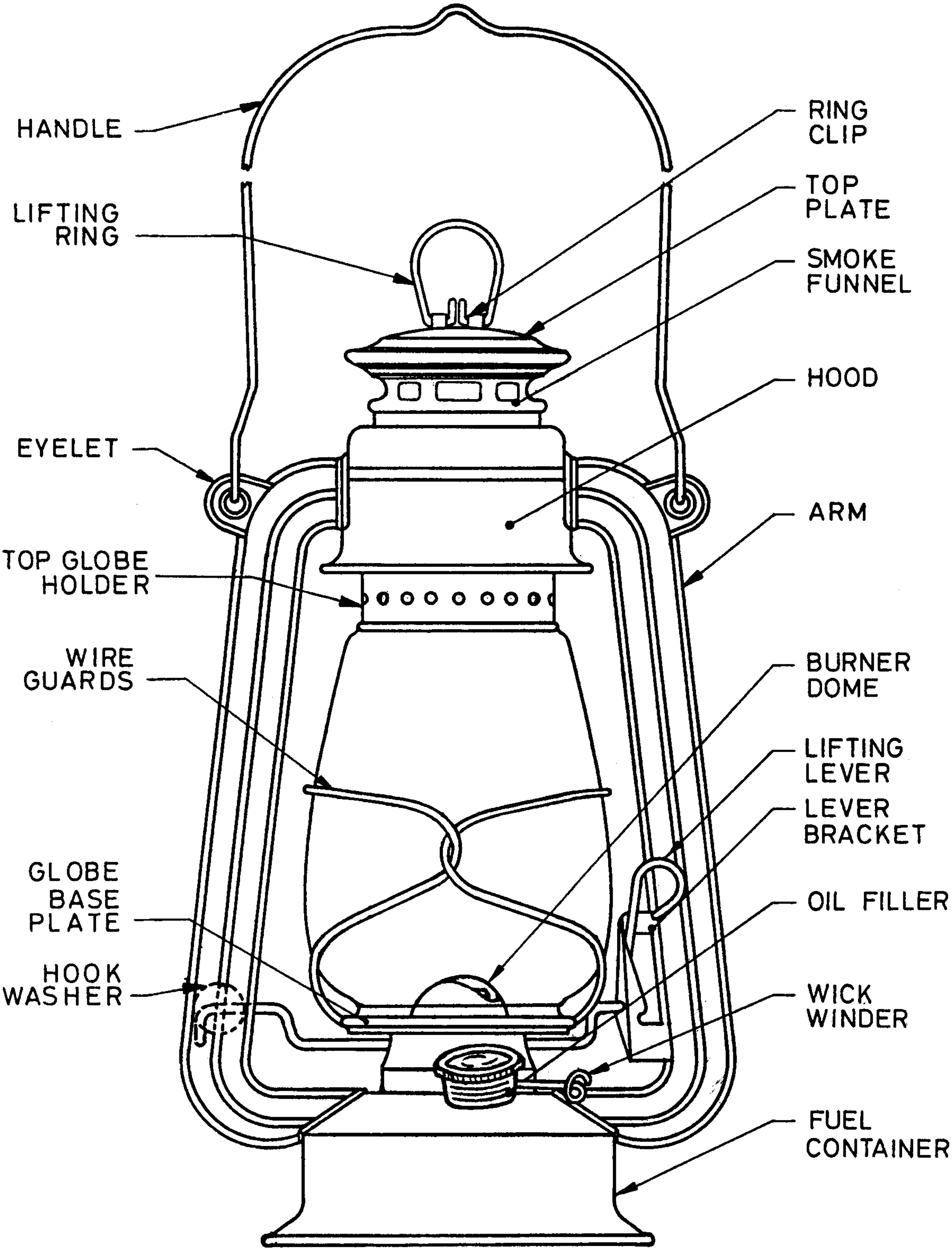


FIG. 2 HURRICANE LANTERN, TYPICAL, TYPE 2

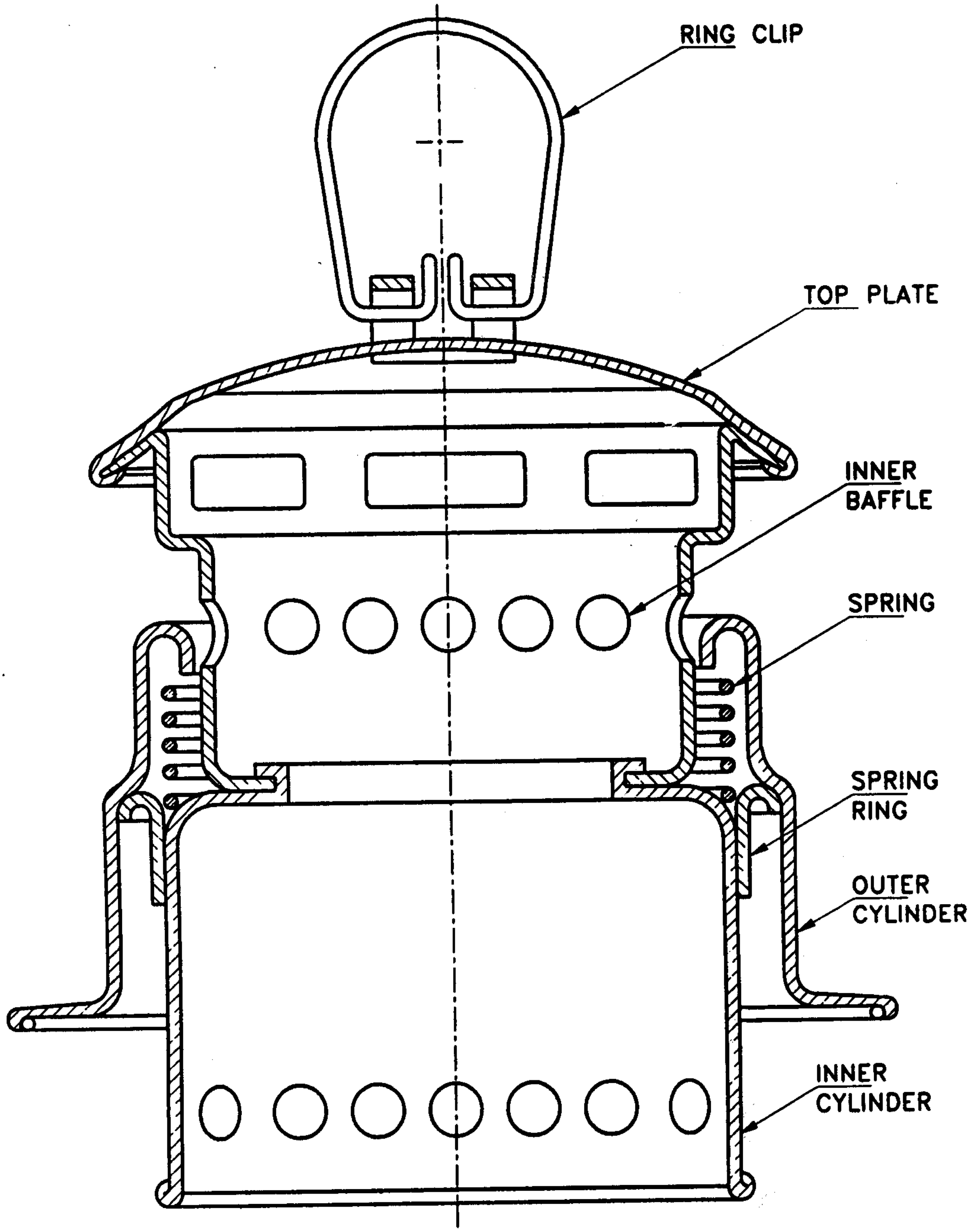


FIG. 3 SMOKE FUNNEL ARRANGEMENT

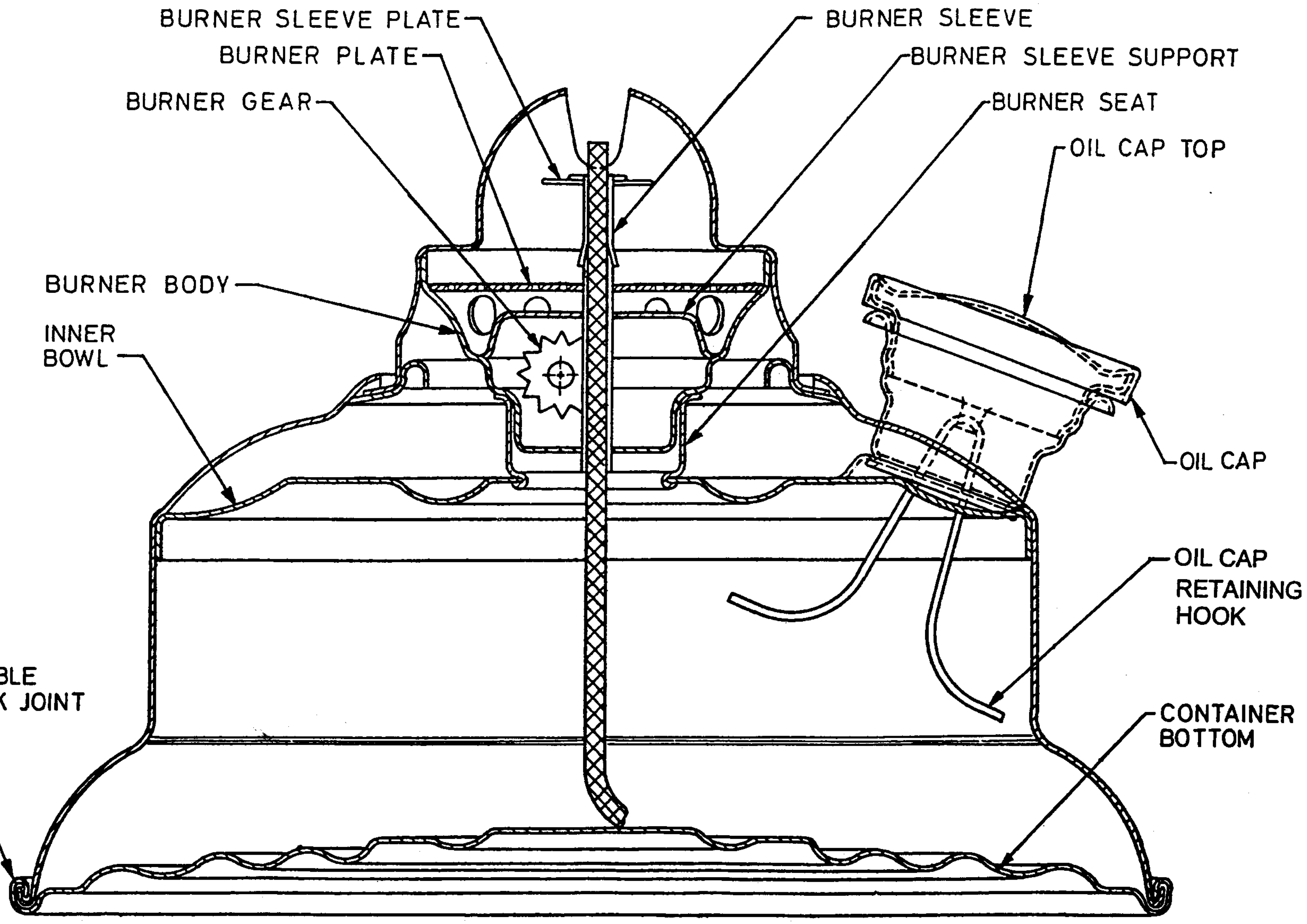


FIG. 4 SECTION OF FUEL CONTAINER

5 MATERIAL

The different components of hurricane lanterns shall be made from materials conforming to the following requirements:

Component	*Minimum Thickness* mm	*Material*	
		Tinned Lantern	Painted Lantern
(1)	(2)	(3)	(4)
Fuel container bottom	0.4	Tinplate (hot dipped or electrolytic) conforming to IS 1993 (11.2/5.6 gm) per sq metre Tin-coating	Carbon steel sheet conforming to IS 513 or IS 1079
Fuel container	0.25		
Top plate			
Inner bowl (center plate)			
Smoke funnel			
Hood (outer case)	0.3	do	do
Ring clip	0.4		
Spring ring	0.3		
Arms	0.3		
Globe base plate	0.3		
Lever bracket	0.8		
Oil cap top	0.3		
Oil cap	0.3	do	do
Oil filler	0.3		
Top globe holder	0.3		
Burner body	0.3		
Burner sleeve support	0.3		
Burner sheet	0.3		
Burner sleeve plate	0.3		
Burner sleeve	0.3	do	do
Burner gear	0.6	or brass sheet conforming to IS 410	Tinplate conforming to IS 1993 or Brass sheet conforming to IS 410
Handle	3.1	Hard drawn mild steel wire (galvanized) of 700-950 MPa tensile strength conforming to IS 280. The galvanized coating shall have a mass of 230 to 240 g/m^2	
Lifting lever	3.1		
Wick winder	3.1		
Lifting ring	2.6		
Wire guard (over lapped)	2.6		
Hook washer	2.0	Hard drawn steel wire conforming to IS 4454 (Part 1) zinc plated or galvanized	
Spring	2.5		

6 DESIGN, CONSTRUCTION AND DIMENSIONS

6.1 General

The construction and the strength of materials of a lantern shall be such that no breakage or distortion can take place under the conditions of use required by **10.5** and **10.6** leading to the discharge of fuel or vapour or which may otherwise affect safe operation.

6.2 The three types of lanterns shall conform generally to the designs given in Fig. 1 and 2. The smoke funnel shall conform generally to the design given in Fig. 3.

6.2.1 The lantern shall have two hollow side tubes called arms, which shall form air/flue gas passages between the hood and the base of the burner support. Fresh air and flue gases shall be drawn into the arms at the top after having been warmed by the heated hood. The opening above the wick in the burner cap shall provide the outlet for the gases drawn into the base of the burner support through the arms.

6.2.2 The arms of the lanterns shall be fixed in such a manner that the plane passing through their centerlines is at right angles with the bottom of the fuel container through its axis, when examined visually. The flanging of the arms at both ends (inside) shall not be less than 3 mm. The joints between the arms and the fuel container and between the arms and the hood shall be spot welded for both tinned and painted lantern.

6.2.3 The burner and the faucet shall be properly aligned and centrally situated. The slot in the dome shall be co-axial with the burner sleeve.

6.3 Fuel Container

6.3.1 The fuel container shall be divided into two compartments, upper and lower, by an inverted saucer shaped disc known as inner bowl. The lower compartment of fuel container is meant to store kerosene whereas the upper portion, to which two arms are connected at diametrically opposite points, serves as duct for hot, fresh air and flue gases sucked in through the arms from where the air passes to the wick. The upper bowl (or compartment) shall have sufficient volume and opening for storing and passage of the mixture of fresh air and flue gases.

6.3.2 The following joints and seams shall be sound and thoroughly fitted:

a) Inside joint between fuel container and inner bowl,
b) Inside joint between oil filler bottom portion and inner bowl, and
c) Inside joint between faucet bottom portion and inner bowl.

6.3.2.1 The bottom rim of the fuel container shall have either double lock joint or solder rubber lining or any other suitable solder joint (*see* Fig. 4) and its shall pass the air pressure test specified in **10.8**.

6.3.2.2 The capacity of the fuel container for lantern of Types 1, 2 and 3 shall be 375, 320 and 250 ml, respectively.

6.3.3 The container and any internal coating materials shall not suffer any thermal or mechanical damage arising from use and operation of the appliance as required by **10.5** and **10.6**.

6.3.4 Container made of carbon steel shall preferably given protective coating by stored epoxy resin/kerosene resistant paint or lacquer.

NOTES

1 Kerosene as such is non-corrosive. Corrosion can occur, however, through the presence of water which may be introduced accidentally or may be condensed from the atmosphere. In such circumstances, the water may be expected to contain the ionizable corrosion promoting compounds that occur normally in natural waters, or as atmospheric pollution.

2 Remove the filler cap and burner from the fuel container and score the bottom inner surface of the container. Fill the container to the full fuel level with distilled water and leave to stand for a period of 48 h at room temperature. Empty the container and examine the inner surfaces and all joints below full fuel level, for evidence of corrosion. Corrosion at the score marks only will give a measure of the efficiency of a corrosion resistant internal coating.

6.4 Burner

6.4.1 The burner shall fit snugly and squarely on the fuel container. The mating parts of the burner shall be so designed and made as to ensure satisfactory fitting and performance. The globe base plate may be perforated.

6.4.2 The burner shall be so constructed that the risk of the flame flashing back into the fuel container is minimized and so arranged that fuel cannot splash on to the flame in normal use.

6.5 Burner Sleeve

The burner sleeve shall have parallel sides and shall be sufficiently strong to avoid harmful distortion in normal use. The joint in the burner sleeve shall be situated centrally between the burner gears. The sleeve shall be soldered or brazed at its bottom joint with the burner body. It shall be so mounted that objectionable fuel leakage in service is prevented. The sleeve shall be vertical when the burner sits squarely on the fuel container.

6.6 Burner Assembly

The burner assembly and any part of the burner which is capable of being detached in normal use, if capable of incorrect assembly, shall have the correct assembly marked on it or illustrated in the instructions for the appliance.

NOTE — It should be so constructed that there is no risk of a flame flashing back into the fuel container and so arranged that the fuel cannot splash on to the flame in normal use.

6.7 Wick Winder

6.7.1 In the wick winder mechanism, the burner gears shall be symmetrical and shall be tightly fitted to the winder to avoid play between the winder and the gears. The teeth of the gears shall not be so sharp as to damage the wick. The winder and the gears shall be co-axial. The winder shall be so fitted that the gaps between the side of the sleeve and the gears are equal, thus ensuring proper movement of the wick.

The mechanism shall give an even adjustment of the wick and shall be so mounted that fuel leakage in service is prevented. It shall be so positioned and constructed as to be readily accessible when the lantern is in operation.

6.8 Oil Filler and Oil Cap

The joint between the oil filler and the fuel container shall be spot welded or riveted with notching. The oil cap when screwed into the oil filler shall fit snugly. Both shall have a knuckle thread having the following nominal dimensions:

Type	*Major Dia* mm	*Pitch* mm
1	25.4	1.81
2	25.4	1.81
3	25.4	1.81

The oil cap shall be provided with a retaining hook shown in Fig. 4 or any other means so that it may not get detached from the container and shall be provided with a rubber washer to make the filler hole assembly oil-tight. The rubber washer shall be resistant to kerosene.

6.9 Globe Lifting Mechanism

The globe lifting mechanism shall consist of a formed wire lift with integral lever and a lever guide which locks the lever at the top and bottom of the lift positions. The wire lift shall be hinged to the globe base plate and supported at both side arms. The lever guide shall be securely welded or riveted to one arm. The lever when pressed shall operate easily and shall lift and lower the assembly comprising the inner cylinder, globe guards and globe base plate, uniformly without fouling against the burner dome. In the lifted position, adequate space under the globe base plate shall be available for lighting the wick with a match stick.

6.10 Wire Guards for Globe

The wire guards for globe shall be either of interlock type or of non-interlock type, in accordance with manufacturing practice or as may be specified by the purchaser. The wire guards shall cross each other at diametrically opposite points adjacent to the unprotected surface of the globe and approximately 50 mm above the bottom edge of the globe. The wire guards shall be securely fastened to the globe base plate and shall hold the globe firmly.

6.11 Smoke Funnel Arrangement

6.11.1 Smoke funnel arrangement shall consist of a hood (outer cylinder), inner cylinder, inner baffle, helical wire spring, top plate and lifting ring. The bottom of the inner cylinder shall completely enclose the rim of the top of the globe. The top of inner cylinder shall have openings to permit burnt gases to escape. The inner cylinder shall extend upwards through the hood and by means of spring shall exert sufficient pressure to hold the globe firmly and securely in position. The top plate shall be so fixed to the funnel as to ensure a strong joint (*see* Fig. 3) and shall be so shaped as to protect the cylinder openings against entrance of rain drops.

6.11.2 The arrangement of inner baffle, and outer and inner cylinder shall be such as to make the normal flame of the wick wind proof and prevent mixing of burnt gases with the fresh air drawn into the side arms. The up and down movement of smoke funnel assembly shall be smooth and central without any deviation.

6.12 Carrying Handle

Carrying handle shall move in the eyelets freely and smoothly and in its normal position it shall remain sufficiently cool for handling when tested as specified in **10.11**. Length of carrying handle shall be such that the lantern withstands the corresponding test specified in **10.11**.

6.13 Removable Parts

Any part of an appliance that is intended to be removed in the course of filling, cleaning or the replacing or trimming of the wick shall be so constructed that it cannot reasonably be fitted incorrectly, or, where size and materials permit, an indication of its correct position in the appliance shall be clearly marked on it or shall be clearly marked on another part of the appliance near that position and in such a manner that the marking may be easily seen when the part is being replaced.

If it is not possible to mark the part or the appliance, for reasons of size or materials only, the correct position of any removable part shall be clearly given in a diagram accompanying the appliance.

If the design of the appliance is such that special tools are required for removable parts, such tools shall be supplied with the appliance.

6.14 Replacement Parts

Any catalogued part of the same model and capacity shall be interchangeable. Replacement burners, wicks, kindlers and catalogued parts shall be clearly identified as to model number.

NOTES

1 These should not cause the appliance to fail to comply with any requirement specified in this standard.

2 If the design of the appliance is such that special tools are required to fit replacement parts normally supplied to the general public, such tools shall be supplied with the appliance.

6.15 Lighting

Lighting shall be possible with a wooden match stick of length 40 ± 4 mm without inconvenience or difficulty.

6.16 Additional Features

Unless otherwise required by the purchaser, hurricane lanterns shall be supplied complete with glass globes and flat cotton wicks conforming to IS 1116 and IS 1740 respectively. The length wick provided for each type of lantern shall be not less than 150 mm.

The overall design and construction of the hurricane lantern shall be such as to give adequate protection to the globe and shall enable the lantern to pass the performance and safety tests given in **10**.

7 WORKMANSHIP AND FINISH

7.1 The different parts of the lanterns shall be well-finished; they shall be free from defects due to unsatisfactory workmanship, such as cracks, burrs, splits, badly made or ill-fitting joints, welding and soldering defects. Sheet metal pressed parts shall be well formed and well shaped. The detachable components shall be so designed as to facilitate correct assembly.

7.2 Lanterns shall be provided with either tinned surface finish or painted surface finish depending upon the requirement of the purchaser.

7.2.1 *Tinned Lanterns*

These shall be tinned by hot-dip process. The tin coating on all parts of the lanterns, including dome, but excluding the burner and the arms, shall be not less than 70 g/m^2, counting both sides, and for the burner and the arms, it shall not be less than 52 g/m^2, counting both sides when determined in accordance with IS 1327. The coating shall be non-brittle, generally smooth, even and free from blisters, blank spots, accumulations, flux inclusions and acid stains.

7.2.2 *Painted Lanterns*

These lanterns shall have their exterior surface finished in aluminium paint (conforming to IS 2339 or stove enamel conforming to IS 2932. The resulting finish shall be hard and shall not readily chip, flake, develop cracks or lose its luster when the lanterns are lighted and kept in that condition for 8 hours. The interior of the fuel container made from carbon steel sheet shall be given a corrosion resistance coating insoluble in kerosene such as epoxy (*see also* **6.3.4**).

8 MARKING

8.1 The name of trade-mark of the manufacturer and the country of origin shall be legibly and indelibly marked on the fuel container and interchangeable parts. The words 'Type 1 or Type 2' shall also be marked.

8.2 BIS Certification Marking

8.2.1 The lanterns may also be marked with the Standard Mark.

8.2.1.1 The use of the Standard Mark is governed by the provisions of *Bureau of Indian Standards Act*, 1986 and the Rules and Regulations made there under. The details of conditions under which the licence for the use of the Standard Mark may be granted to manufacturers or producers may be obtained from the Bureau of Indian Standards.

9 PACKING

Each lantern shall be put in a craft paper bag and then packed in wooden or corrugated fibre-board box as agreed to between the purchaser and the supplier. The number of lanterns to be packed in each box shall be in the multiple of 5 for all types of lanterns.

10 PERFORMANCE AND SAFETY TESTS

10.1 Capacity (Maximum)

It shall be measured when the fuel container is so full that no more fuel can be added when lantern is resting on a level surface.

10.2 Fuel for Performance Tests

The kerosene to be used in conducting performance tests mentioned below shall conform to IS 1459.

10.3 Mean Horizontal Luminous Intensity (MHLI)

The lanterns, when tested by the method described in Annex A or Annex B as agreed to between the manufacturer and the purchaser, shall have the following mean horizontal luminous intensities according to smoke point used:

Sl No.	*Smoke Point of Kerosene oil* mm	*Mean Horizontal Luminous Intensity*					
		Type 1		Type 2		Type 3	
		Tinned	Painted	Tinned	Painted	Tinned	Painted
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	18	4.8	4.5	4.8	4.5	2.8	2.5
ii)	21	5.4	5.0	5.4	5.0	5.4	5.0
iii)	24	6.0	5.5	6.0	5.5	6.0	5.5

NOTE — When kerosene of smoke point other than the above is used, the corresponding values of luminous intensity shall be reduced by 0.2 candela for 1 mm reduction of smoke point considering 24 mm as the base for both tinned and painted lanterns.

10.4 Lighting Efficiency

The lighting efficiency of the lanterns that is, the mean horizontal luminous intensity (MHLI) candelas per gram of kerosene burnt per hour, shall be not less than 0.25 all for tinned lanterns and 0.22 for painted lanterns of all types. If MHLI is determined by the method given in Annex A, then the fuel consumption rate shall be determined as given in Annex C. If MHLI is determined by the method given in Annex B, which itself includes the method for determining the rate of fuel consumption, then Annex C shall be ignored.

10.5 Flame Creep

There shall be no spreading of fuel over any external part of the appliance during a period of 4 h following its final adjustment, when operated at the manufacturer's stated maximum flame setting.

10.6 Safety on Overturning

For appliances designed for use on horizontal surfaces, the fuel spillage during the first 15s after overturning shall not exceed 55 ml per burner or, where a burner has more than one wick, 55 ml for each wick having its own winder, when tested in accordance with **F-2.1**.

NOTE — This requirement is intended to ensure that provided the appliance is righted without delay following accidental overturning, the fuel spilled will be unlikely to prove a serious hazard even if it becomes ignited.

There shall be no distortion, fracture or breakage of any part that would cause the appliance to become unsafe when the appliance is subjected to the unasserted free falls described in **D-2.2**. Breakage of decorative globes and shades only shall not constitute failure to meet this requirement.

10.7 Duration of Burning for One Fill

With the fuel container filled to capacity, the lantern shall be allowed to burn continuously, the flame being adjusted to its maximum height without smoking. The duration of burning shall be not less than 13 hours for all sizes of lanterns. The appliance shall not catch fire when it is burned continuously.

10.8 Air Pressure Test

The lower compartment of the fuel container of each lantern shall be subjected to an air pressure of 19.6 kN/m^2 (0.2 kgf/cm^2), the air being reasonably free from moisture. There shall be no leakage from the joint at the bottom rim of the fuel container.

10.9 Surface Temperature

The surface temperature of parts such as wick-winder lifting handle, lifting lever, oil filler cap and lower part of the arm of the lantern, that are likely to be touched during its operation shall not exceed 60°C when measured in accordance with the method described in Annex E.

10.10 Storm Proofness

10.10.1 An atmosphere of wind shall be created by producing a wind of velocity 70 km/hour as explained in Annex F. The lantern shall be exposed to this atmosphere in the lighted condition with normal size flame for period of 1 min. It shall not go off and shall continue to function satisfactorily during the test.

10.10.2 The lantern shall withstand being swung with a pendulum motion when suspended on a rod by its handle, through an angle of 45° to each side of the vertical plane without the flame impinging on the globe, the flame being adjusted to maximum height without smoking. There shall be no leakage of oil from any joint or any side.

10.11 Test for Carrying Handle

After the lantern, when lying on a plane surface has been burning with a normal flame for 3 hours, the lantern shall be picked up by the carrying handle and checked for conformity with the requirements of **6.12**.

A piece of black card, 100 mm × 50 mm shall be held horizontally in still air, 25 mm below the top of the handle when the lantern is burning with a normal flame, until a reasonably steady temperature is attained. The card shall not attain a temperature exceeding 66°C.

10.12 Stability

The lantern, both when full and when empty, shall be capable of being tipped to an angle of 25° from the vertical in any direction. It shall not overturn when released.

10.13 Safety Test

The lantern shall not catch fire when it is burnt for a period of 12 hours at any wick height below its normal full flame height.

11 SAMPLING PLAN AND CRITERIA FOR ACCEPTANCE

Subject to agreement between the purchaser and the supplier a sampling plan and criteria for conformity may be adopted as given in Annex G.

ANNEX A

(*Clause* 10.3)

METHOD FOR MEASUREMENT OF MEAN HORIZONTAL LUMINOUS INTENSITY

A-1 GENERAL

A-1.1 The lantern shall be tested with its fuel container filled up with the filtered kerosene up to the level of oil filler cap (that is up to the bottom level of the faucet).

A-2 PREPARATION OF THE WICK AND THE FLAME

A-2.1 The wick shall be prepared in such a way that a wide and generally semi-circular flame is obtained. The height of the flame for the test shall be the maximum to which it can be turned without smoking.

A-3 PHOTOMETRIC EQUIPMENT

A-3.1 The mean horizontal luminous of intensity of the lantern shall be measured against a metal filament, sub-standard electric lamp mounted on a standard photometer bench, with a suitable form of photometer head.

A-4 PROCEDURE FOR MEASUREMENT

A-4.1 The globe of the lantern shall be thoroughly cleaned for this test. The lantern before test shall be kept burning for at least half an hour to attain a steady condition. To carry out the test the lantern shall be mounted on a table fixed on one of the carriages of the photometer bench. The middle portion of the flame, photometer head, and the sub-standard electric lamp shall be in the same horizontal plane and the photometer head shall be placed perpendicular to the incident light from the flame head. The sub-standard lamp and the photometer head shall be kept fixed at any convenient position on the bench.

A-4.2 The lantern shall be moved to and fro on one side of the photometer head until the position of balance is found. Measurement shall be made in a horizontal plane by changing the position of the lantern in four directions at right angles to the axis of the lantern differing by 90°. A number of readings in each direction shall be taken and the average of all these measurements in four directions shall be the mean horizontal luminous intensity.

ANNEX B

(*Clauses* 10.3 *and* 10.4)

LUXMETER METHOD OF MEASUREMENT OF MEAN HORIZONTAL LUMINOUS INTENSITY

B-1 PREPARATON OF THE LANTERN AND THE WICK

B-1.1 The fuel container of the lantern shall be filled with the filtered kerosene up to the level of oil filler cap (that is up to the bottom level of the faucet).

B-1.2 The globe of the lantern shall be thoroughly cleaned with soap and water, rinsed with distilled water and dried.

B-1.3 New wick shall be used for each test which shall be of three hours duration. The wick shall be trimmed in the following manner to get a regular semi-circular flame:

a) Cut the wick levelled with the wick-guide (that is, burner sleeve);

b) Raise the wick and cut off a triangular portion from each corner and round off the sharp corners slightly, as shown in the side view in Fig. 5; and

c) Remove any ragged projections from the top edges of the wick by beveling them slightly as shown in the front view in Fig. 5.

B-2 PHOTOMETRIC EQUIPMENT

B-2.1 The measurement of mean horizontal luminous intensity and fuel consumption rate shall be done in a wooden enclosure having dimensions 1 300 mm × 450 mm × 750 mm, painted black from inside with dull black paint (*see* Fig. 6) and incorporated with the following:

a) Optical bench;

b) Two uprights, which can be slided over the bench;

c) A rotatable metallic disc mounted upright for placing the lantern; and

d) Luxmeter.

The enclosure may have sliding door in the front. The top may be made into two halves, fixed with hinges, so

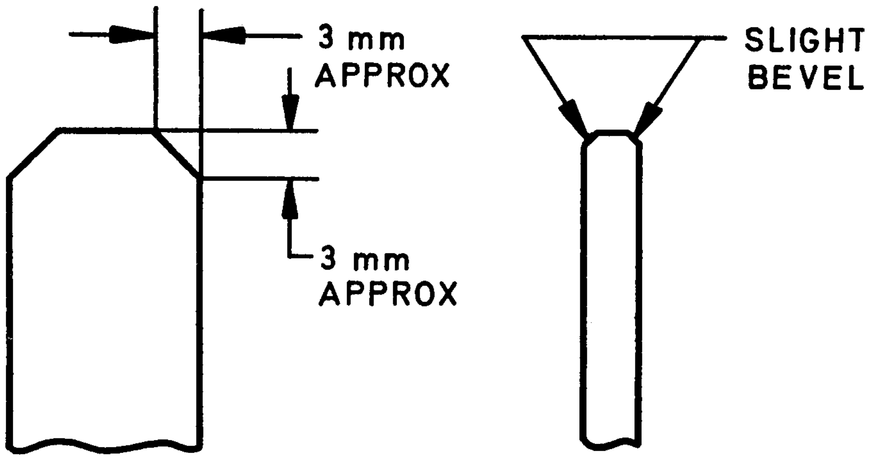


FIG. 5 VIEWS OF WICK

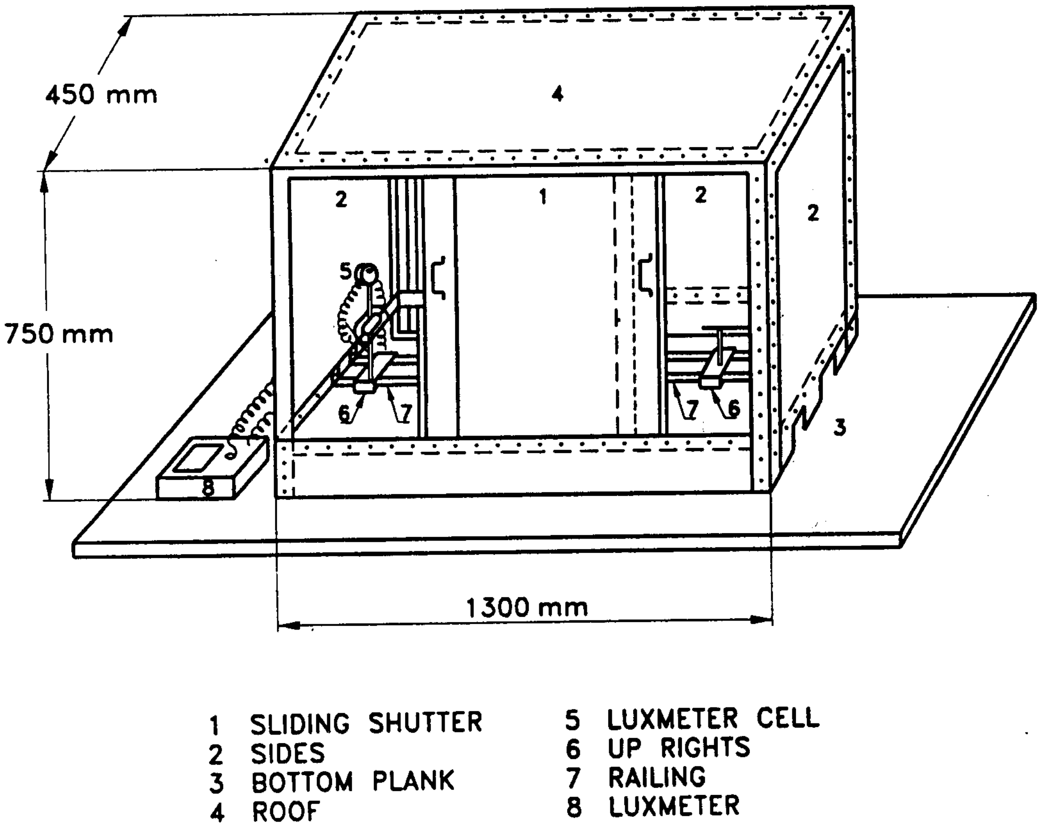


FIG. 6 ENCLOSURE FOR LUMINOSITY TEST

that one half may be lifted off when measurements are not being taken, while the lantern is still burning inside the enclosure. Suitable openings may be provided at the bottom of the enclosure for the entry of fresh air.

B-3 PROCEDURE

B-3.1 The lantern before the test shall be kept burning for at least 30 min to attain a condition at its maximum non-smoking flame height. Then the initial weight of the lantern shall be taken while it is alight.

B-3.2 The lantern shall be kept burning during next 3 h (after initial weighing) continuously inside the enclosure free from air drafts at its maximum non-smoking flame height. The distance between flame of the lantern and photoelectric cell shall be adjusted to 100 cm. The flame and photoelectric cell shall be in the horizontal plane and maximum incident light from the flame should fall on the cell.

B-3.3 The measurement of lux shall be made in four directions by rotating the lantern at every 90° angle. Average of the four readings shall be taken. Such readings shall be taken after every 1 h (that is, after first, second and third hour). The average of these three readings shall be noted.

At the end of the third hour, the final mass of the lantern shall be taken and the average fuel consumption in g/hour shall be noted. During and at the end of the test, any abnormality in functioning such as instability of flame, soot formation on the interior of the globe tendency to catch fire due to leakage of vapours in the dome, etc, shall be noted. If any of these characteristics is present, the whole test shall be repeated after carrying out the necessary adjustments.

B-4 CALCULATIONS

B-4.1 Luminous intensity and the lighting efficiency shall be calculated by the following formulae:

$$\text{Luminous intensity (candelas)} = \text{Lux} \times (\text{Distance in metres})^2$$

$$\text{Lighting efficiency (cd/g/h)} = \frac{\text{Luminous intensity (cd)}}{\text{Fuel consumption in g/h}}$$

ANNEX C

(*Clause* 10.4)

METHOD FOR DETERMINING THE RATE OF FUEL CONSUMPTION

C-1 PREPARATON OF LANTERN

C-1.1 To carry out this test, the fuel container of the lantern shall be filled with the filtered kerosene up to the level of oil filler cap (that is up to the bottom level of the faucet) and the wick and the flame shall be prepared as described in **A-2.1**.

C-2 PROCEDURE

C-2.1 The lantern before actual test shall be kept burning for at least half an hour to attain steady condition. The lantern shall then be weighed, while still alight, and this shall be regarded as the initial mass. Keeping the lantern alight, its mass shall be determined after every one hour for a period of 3 h. The difference between the consecutive masses expressed in grams is the fuel consumption per hour. The average of the above three values shall be considered as the final result.

C-2.2 During and at the end of the test, any abnormality in functioning such as instability of flame, soot formation on the interior of the globe tendency to catch fire due to leakage of vapours in the dome, etc shall be noted. If any of these characteristics is present, the whole test shall be repeated after carrying out the necessary adjustments.

ANNEX D

(*Clause* 10.6)

SAFETY ON OVERTURNING

D-1 APPARATUS

D-1.1 Metal tray, of known mass and large enough to allow the appliance to fall freely on to it.

D-2 PROCEDURE

D-2.1 Set the burner at the flame size found by previous experimentation to be the most severe for the test but do not light the appliance.

Fill the fuel container to the full fuel level and stand the appliance on a metal tray (**D-1.1**). Push the top of the appliance in one movement beyond its point of balance and allow it to fall freely until it is about to impact the tray when it is arrested so as to avoid damage to the appliance. Carry out this procedure in four directions with the appliance falling each time at 90° to the preceding test.

After each fall allow the appliance to remain at rest for 15 s; at the end of this time measure the amount of any fuel spilled in the 15 s.

Between each test remove any spilled fuel from the tray and appliance surfaces.

D-2.2 Repeat **D-2.1**, allowing the appliance to impact upon the tray, without intermediate arresting, and ignoring any fuel spillage not resulting from physical damage to the appliance.

Empty all fuel out of the appliance and repeat the sequence of unasserted falls.

D-3 EXPRESSION OF RESULTS

Calculate and report the volume of fuel spilled (in millilitres) for each direction by subtracting the original mass of the tray (in grams) from the final mass of the tray and spilled fuel (in grams) and converting this mass to volume units by estimating the density of the fuel to be 0.8 g/ml.

Report any distortion, fracture or breakage occurring in the unasserted falls which would render the appliance unsafe for further use.

ANNEX E

(*Clause* 10.9)

METHOD OF MEASUREMENT OF SURFACE TEMPERATURE

E-1 PREPARATION OF LANTERN

E-1.1 The lantern shall be tested with the fuel container containing approximately 75 percent of the amount of fuel which it would hold when full, and the wick shall be prepared as in **A-2.1.** The glass globe shall be cleaned before the commencement of the test.

E-2 PROCEDURE

E-2.1 The temperature of all parts of the lantern which may be necessary to touch for its operation shall be measured by using a mercury bulb thermometer. The temperature shall be measured every 30 min, until equilibrium is reached. While measuring the temperature, the thermometer shall be covered with a felt pad and kept in contact with that part for sufficient period until the maximum temperature is reached.

The surface temperature noted above shall be corrected according to the following formulae:

Standard room temperature = 27 °C
Test room temperature = X °C
Surface temperature (average) = Y °C
Corrected surface temperature = $Y-(X-27\,°\mathrm{C})$

ANNEX F

(*Clause* 10.10.1)

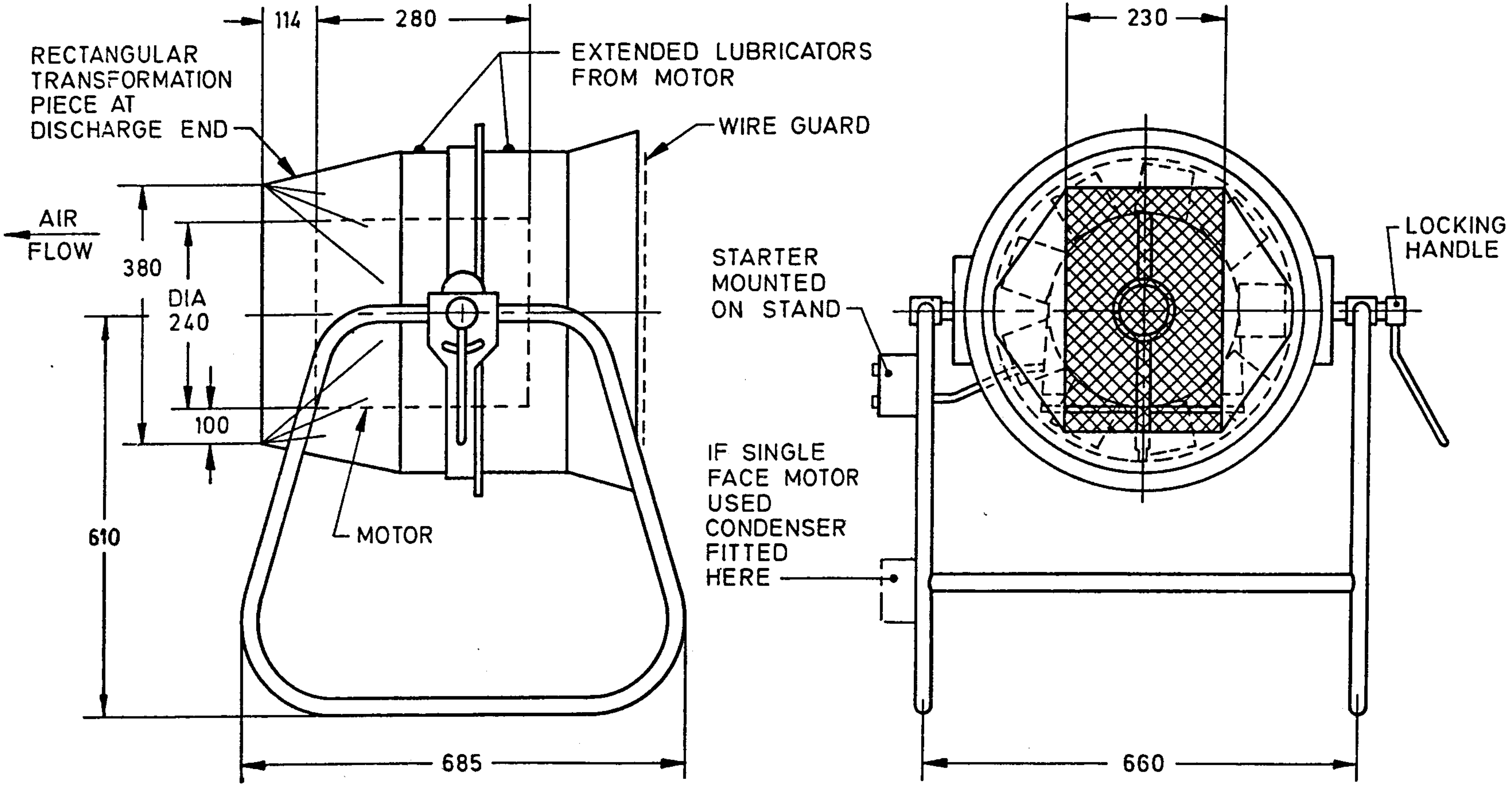
APPARATUS AND METHOD OF MEASURING STORM PROOFNESS OF HURRICANE LANTERNS

F-1 DESCRIPTION OF APPARATUS

F-1.1 A typical apparatus to be used is shown in Fig. 7. It consists of a simple open circuit wind tunnel which will provide a maximum wind speed of 70 km/h in a plane 105 cm from the parallel to its outlet. The impeller is a 9 bladed 45 cm diameter fan with a blade angle of 25° and runs at a speed of 2.850 rev/min.

F-2 METHOD OF TEST

F-2.1 The lantern shall be placed in a plane 105 cm from and parallel to the plane of the rectangular outlet orifice of the apparatus at that point which gives the maximum wind velocity and in a position where its functioning is worst affected.


114
280
230
RECTANGULAR TRANSFORMATION PIECE AT DISCHARGE END
EXTENDED LUBRICATORS FROM MOTOR
WIRE GUARD
AIR FLOW
380
DIA 240
100
610
MOTOR
685
STARTER MOUNTED ON STAND
LOCKING HANDLE
IF SINGLE FACE MOTOR USED CONDENSER FITTED HERE
660

All dimensions in millimetres.

FIG. 7 GENERAL ARRANGEMENT OF A SUITABLE FAN FOR WIND

ANNEX G

(*Clause* 11)

SAMPLING PLAN AND CRITERIA FOR ACCEPTANCE

G-1 SAMPLING PROCEDURE

G-1.1 Lot

All the hurricane lanterns of the same type produced under similar conditions from the same raw material shall constitute a lot.

G-1.2 Selection of Samples

The number of hurricane lanterns to be selected from a lot shall depend upon the size of the lot and shall be in accordance with col 1, 2 and 4 of Table 1.

G-1.2.1 If the lot size is up to 500 then 5 boxes of hurricane lanterns shall be selected at random otherwise 10 boxes shall be selected at random from the lot for drawing sample of hurricane lanterns. In order to ensure the randomness of selection, procedures given in IS 4905 may be followed.

G-1.3 Number of Test and Criterion for Conformity

G-1.3.1 Number of hurricane lanterns selected at random in accordance with col 2 of Table 1 shall be tested for requirements of design, construction and dimension (*see* **6**) and of finish (*see* 7), the lot shall be considered as conforming to these requirements if the number of defectives found in the sample is less than or equal to the corresponding permissible number of defectives as given in col 3 of Table 1.

G-1.3.2 The lot having been found conforming to **G-1.3.1** shall be tested for performance and safety requirements (*see* **10**). For this purpose, a sub-sample of size given in col 4 of Table 1 shall be taken from hurricane lanterns as selected for **11**. The lot shall be considered as conforming to the requirements of the above mentioned tests if the number of defective hurricane lanterns in the sample is less than or equal to the corresponding permissible number of defectives as given in col. 5 of Table 1.

G-1.3.3 The lot shall be considered as conforming to the standard if **G-1.3.1** and **G-1.3.2** are satisfied.

Table 1 Sample Size and Criterion for Conformity

(*Clauses* G-1.2, G-1.3.1 *and* G-1.3.2)

Lot Size	For Design, Construction and Dimension Workmanship and Finish		For Performance and Safety Tests	
	Sample Size	Acceptance Number	Sub-sample size	Acceptance Number
(1)	(2)	(3)	(4)	(5)
Up to 150	3	1	5	0
151 to 300	13	1	8	0
301 to 500	20	2	8	0
501 to 1 000	32	3	13	1
1 001 to 3 000	50	5	13	1
3 001 and above	80	7	20	1

ANNEX H

(*Foreword*)

COMMITTEE COMPOSITION

Oil Burning Appliances Sectional Committee, ME 26

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Headquarters:

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